

ARL 01-37

Remarks

Claims 13-25 were pending in the Application. Claims 18-25 have been withdrawn by the Examiner. Claims 13-17 have been Rejected under 35 U.S.C. 102. Claims 14 and 16 have been amended to eliminate a redundancy in the first lines. These amendments are not believed to effect the scope the claims.

Response to Detailed Action***Claim Rejections--35 USC § 102***

In the Office Action dated December 20, 2007, the Examiner has stated, *inter alia*:

Claims 13-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Inoue et al. (6506520).

As to claims 13-17, Inoue, et al, discloses a lithium oxygen battery comprising an electrolyte solution, the battery comprising a lithium metal containing anode (col. 4 lines 11-45), a cathode comprising carbon (col. 7 lines 1-5), the electrolyte comprising a lithium salt LiPF₆ (Col. 8 lines 6-9), and a non-aqueous solvent comprising dimethoxyethane and ethylene carbonate (col. 7 line 50-col.8 lines 1-5).

As to the group of solvents having an oxygen solubility of greater than 0.1632ccO₂/cc solvent at STP, since Inoue discloses DME the same material desired by the applicant comprising an oxygen solubility of greater than 0.1632ccO₂/cc solvent at STP, it is inherent that Inoue discloses a non-aqueous solvent having an oxygen solubility of greater than 0.1632ccO₂/cc solvent at STP.

As to the solvents having an oxygen solubility of less than 1150cc O₂/cc at STP, since Inoue discloses ethylene carbonate, the same material desired by the applicant comprising the an oxygen solubility of less than 1150cc O₂/cc at STP, it is inherent that Inoue discloses a non aqueous solvent comprising an oxygen solubility of less than 1150cc O₂/cc at STP.

As to wherein the oxygen solubility of the solvent combination is at least 0.1150ccO₂/cc at STP and wherein oxygen is reduced at a cathode surface of the metal oxygen battery to produce O⁻² or O₂⁻² ions and increase in the amount of dissolved oxygen in the electrolyte increases the specific capacity of the cathode, since Inoue discloses the same materials for the aqueous solvent desired by the applicant, it is inherent that the oxygen solubility of the solvent combination is at least 0.1150ccO₂/cc at STP and wherein oxygen is reduced at a cathode surface of the metal oxygen battery to produce O⁻² or O₂⁻² ions and increase in the amount of dissolved oxygen in the electrolyte increases the specific capacity of

ARL 01-37

the cathode.

The examiner is incorrect in stating that Inoue, et al (Inoue) is directed to a lithium oxygen battery. This is not the case as it is clear from Col. 1, line 27, which identifies the Inoue battery as being a lithium *ion* battery.

As described in the Background of the Invention, at paragraph [0003]:

Metal-oxygen batteries, which are also referred to as metal-air batteries, are a class of electrochemical cells in which oxygen, which is typically obtained from the ambient environment, is reduced at a catalytic cathode surface as part of the electrochemical reaction. Reduction of the oxygen forms an oxide or peroxide ion which reacts with a cationic metal species.

Metal/oxygen batteries are unique in that the cathode active material is not stored in the battery. *Oxygen from the environment* is reduced at a catalytic air electrode surface forming either an oxide or peroxide ion that then reacts with cationic species in the electrolyte. Specifically, during the discharge of the cell, oxygen is reduced at the electro-active cathode to produce O^{2-} and/or O_2^{2-} ions which react with the lithium to produce Li_2O_2 and/or Li_2O which deposits on the cathode. See, e.g., U.S. Patent No. 7,147,967 to Read. Metal/oxygen batteries have been developed based on Fe, Zn, Al, Mg, Ca, and Li. The zinc/oxygen battery is in commercial use for hearing aids. See, e.g., Characterization of Lithium/Oxygen Organic Electrolyte Battery, by J. Read, et al., US Army Research Laboratory (cited to the USPTO in the IDS dated October 24, 2003) Metal-oxygen or metal/air batteries are unique in that the air cathode active material, oxygen, is *not stored internal* to the cell/battery system. Oxygen is provided by access of air to the porous carbon cathode electrode for the half-cell oxygen reduction process. See for example, "Diffusion-limited model for a lithium/air battery with an organic electrolyte," by S.S. Sandhua, J.P. Fellner, and G.W. Brutchon.¹

In contrast, Inoue discloses a sealed lithium ion battery cell and does not disclose oxygen at a cathode surface which is reduced by the electro-active cathode to produce O^{2-} and/or O_2^{2-} ions. Instead, the Inoue cell is sealed off from the environment (see, e.g., Figure 1 of Inoue). No oxygen source is disclosed in Inoue. The lithium ion battery disclosed in Inoue does not function in the same manner as metal-oxygen batteries. Inoue discloses a closed, sealed battery (1) comprising a sealing plate (2). The examiner has shown no basis for stating that:

[In Inoue] oxygen is reduced at a cathode surface of the metal oxygen battery to produce O^{2-} or O_2^{2-} ions and increase in the amount of dissolved oxygen in the electrolyte increases the specific capacity of the

¹ http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TH1-4MBT21W-9&_user=16904&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000001918&_version=1&_urlVersion=0&_userid=16904&md5=86851144c83a33da0be7eb6449483ee7

ARL 01-37

cathode, since Inoue discloses the same materials for the aqueous solvent desired by the applicant, it is inherent that the oxygen solubility of the solvent combination is at least 0.1150ccO₂/cc at STP and wherein oxygen is reduced at a cathode surface of the metal oxygen battery to produce O⁻² or O₂⁻² ions and increase in the amount of dissolved oxygen in the electrolyte increases the specific capacity of the cathode.

Inoue is not a lithium/oxygen battery and there is no disclosure in Inoue that suggests that it functions in the manner envisioned by the examiner. It is incumbent upon the Examiner to show where in Inoue oxygen is reduced at the cathode surface to produce O⁻² and/or O₂⁻² ions. It appears that the Examiner is under the mistaken belief that because Inoue broadly refers to some of the electrolytes that are being claimed, that the reduction of oxygen occurs in Inoue, without providing any rationale or evidence to support this conclusion. Instead, the Examiner asserts that the reduction of oxygen in the sealed Inoue cell is inherent. However, as stated in the case of *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990):

In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.

No basis in fact or technical reasoning has been provided to support the characteristics that the Examiner states are inherent. For example, there is no showing that, *inter alia*, an increase in the amount of dissolved oxygen in the electrolyte in the battery of Inoue would increase the specific capacity of the cathode.

As stated in the Manual of Patent Examining Procedure (MPEP) Eighth Edition, August 2001, August 2006 revision, at paragraph 2131 "TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM 'A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)." It is respectfully submitted that Inoue does not anticipate claims 13-17 for, *inter alia*, the reasons stated above. Moreover, Inoue discloses a long list of materials and compositions of which the examiner has selectively chosen in order to attempt to meet the limitations of the claims without providing any justification for doing so. As discussed in the Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International v. Teleflex Inc.*, the Examiner has not provided rationale to support the rejection.

As to claim 14, Inoue does not disclose a metal-oxygen battery comprising, *inter alia*, a cathode for reducing the oxygen, wherein oxygen is reduced at a cathode surface of the metal-oxygen battery to produce O⁻² or O₂⁻² ions and an increase in the amount of

ARL 01-37

dissolved oxygen in the electrolyte increases the specific capacity of the cathode. Nonetheless, the examiner states that "it is inherent . . . [that] oxygen is reduced at a cathode surface of the metal oxygen battery to produce O^{-2} or O_2^{-2} ions." However, as stated in the case of *Ex parte Levy*, "the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art."

According to MPEP 2112:

Inherency IV. EXAMINER MUST PROVIDE RATIONALE OR EVIDENCE TENDING TO SHOW INHERENCY

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted).

* * * *

It is respectfully submitted that the Examiner has not provided sufficient rationale and evidentiary support for the "inherent" functions that the examiner contends Inoue has and/or provides. The examiner has taken a lithium-ion battery which is sealed and stated that it is a lithium oxygen battery, without providing any rationale for doing so. Moreover, the examiner has asserted that the battery of Inoue functions in a manner like that of the present invention on the basis that Inoue discloses similar combinations of electrolyte substances. There is simply no basis for this contention. The examiner has not properly applied the doctrine of inherency. There is simply no basis in law or fact for the presumptions made by the examiner. Reconsideration and allowance of the claims, including those claims withdrawn pursuant to the restriction requirement, is requested.

Conclusion

Applicant believes that Examiner's Rejections have been responded to and overcome, such as to place the Application into Condition for Allowance. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

ARL 01-37

The Examiner is invited to telephone the undersigned at the local telephone number given below if, after considering this reply, the Examiner is of the opinion that the Applicant have not resolved all outstanding issues in this case and brought the case into Condition for Allowance.

Respectfully submitted,



Lawrence E. Anderson
Attorney for Applicants
Reg. No. 29,503
(301) 394-0613